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ARS 833 (2012) (English): Fried banana chips -- Specification

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Fried banana chips — Specification

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Foreword

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Introduction

Fried banana chips are a deep fried snack food prepared from green fresh mature bananas of the cooking variety. Success in deep-fat frying of snack foods depends upon several factors, such as (a) the use of proper raw material of optimum maturity or quality, (b) correct method of preparation, (c) use of suitable equipment, (d) selection of appropriate fat or oil as frying medium, (e) optimum time and temperature of frying, (f) efficient packaging, and (g) proper storage. Though consumption of these products is at present very high there is no systematic quality control. The formulation of this standard is intended to assist in the manufacture and sale of standardized, nutritious, safer and more hygienically processed products.

Fried banana chips are prepared by peeling and slicing fully matured but unripe bananas and deep-fat frying the slices in suitable edible oil or fat, or combinations thereof. The bananas are sliced breadthwise to give thin circles that are dropped straight into the frying medium held at proper temperature for a time to render them crisp. Salt and other seasonings are added after frying. When coconut oil is used, antioxidants are not found useful. However, when groundnut or similar unsaturated oils are used, permitted antioxidants in the frying media are sufficient to give protection to the banana chips.

Fried banana chips — Specification

1 Scope

This standard prescribes the requirements and the methods of sampling and test for fried banana chips.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ARS 53, *General principles of food hygiene — Code of practice*

ARS 56, *Prepackaged foods — Labelling*

ARS 471, *Food grade salt — Specification*

CD-ARS 831-2012, *Fresh bananas — Specification*

CODEX Stan 192, *General standard for food additives*

CODEX STAN 193, *Codex general standard for contaminants and toxins in food and feed*

ISO 712, *Cereals and cereal products — Determination of moisture content — Reference method*

ISO 2171, *Cereals, pulses and by-products — Determination of ash yield by incineration*

ISO 3960, *Animal and vegetable fats and oils – Determination of peroxide value – Iodometric (visual) endpoint determination*

ISO 5498*, Agricultural food products — Determination of crude fibre content — General method*

ISO 6579, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection of Salmonella* spp.

ISO 7251, *Microbiology of food and animal feeding stuffs — Horizontal method for the detection and enumeration of presumptive Escherichia coli — Most probable number technique*

ISO 13690, *Cereals, pulses and milled products — Sampling of static batches*

ISO 21527-1, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds — Part 1: Colony count technique in products with water activity greater than 0.95*

3 Definitions

For the purpose of this standard the following definitions apply.

3.1
fried banana chip
product prepared from clean, mature, sound mature unripe bananas subjected to a deep frying process to make them crispy and ready for consumption

3.2
food grade material
material that is free from substances that are hazardous to human health and may be permitted to come in contact with food.

3.3
foreign matter
organic and inorganic materials (such as sand, soil, glass) other than extraneous matter in the crisps

3.4
extraneous matter
organic matter of banana origin other than sweet potato crisps

4 Essential quality and compositional requirements

4.1 Raw materials

The following materials shall be used in the processing of banana crisps:

4.1.1 **Bananas** — fully mature, unripe, complying with CD-ARS 831-2012.

4.1.2 **Edible oil or fat** — Shall comply with the relevant African Standards.

4.2 Optional ingredients

4.2.1 Edible salt — Shall comply with ARS 471.

4.2.2 Spices and condiments — Spices shall be clean, freshly ground like chilli, pepper or others or combinations thereof, free from infection, infestation, foreign matter and undesirable odour or taste and conforming to the relevant African Standards.

4.2.3 Permitted flavourings

4.2.4 Citric acid or tartaric acid

4.3 Physical requirements of the finished product

4.3.1 The fried banana chips shall have an attractive yellow to golden yellow colour, crisp texture, and pleasant taste and odour.

4.3.2 Salt and other seasoning shall be added to taste.

4.3.3 The chips shall have a uniform surface, free from blisters, excessive brown pigmentation and wet centres.

4.3.4 The chips shall not be excessively greasy and shall be free from rancidity and other objectionable odours and taste.

4.3.5 The fried banana chips shall be free from insects, insect residues, rodent hair and excreta, and fungal infestation.

4.3.6 The frying medium shall be regularly replaced with fresh batches of oil or fat, or combinations thereof, to conform to good manufacturing practices. Temperature of the frying medium shall not exceed the smoke point.

4.3.7 When packed, not more than 2 per cent of the product shall have the following defects:

(i) Surface or internal pigmentation.

(ii) Black, dark brown or reddish discolouration.

(iii) Peels.

4.4 Chemical requirements

Fried banana chips shall conform to the chemical requirements specified in Table 1.

Table 1 — Requirements for fried banana chips

S/N	Parameter	Requirements	Method of test
1	Moisture content, %, by mass, max.	5.0	ISO 712
2	Fat content on dry weight basis, %, max.	15 – 35	Annex A
3	Free fatty acids on dry weight basis, %, max.	0.5	Annex B
4	Sodium chloride (NaCl) on dry weight basis, %, max	2.0	Annex C
5	Acid insoluble ash, %, by mass, max	0.05	Annex D
6	Peroxide value, meq oxygen per gram	0.1	ISO 3960

5 Food additives

Food additives may be used in the preparation of banana chips in accordance with CODEX Stan 192.

6 Contaminants

6.1 Pesticide residues

Banana chips shall conform to maximum residue limits for pesticide residues established by the Codex Alimentarius Commission for this commodity.

6.2 Other contaminants

Banana chips shall comply with the maximum levels of the Codex General Standard for Contaminants and Toxins in Food and Feed (CODEX STAN 193).

7 Hygiene

Banana chips shall be prepared and handled in a hygienic manner in accordance with ARS 53 and shall conform to microbiological limits specified in Table 2.

Table 2 — Microbiological limits for banana chips

S/N	Micro-organism(s)	Requirements	Method of test
1	*Escherichia coli,* cfu/g, max.	<1	ISO 7251
2	*Salmonella*, 25g, max.	absent	ISO 6579
3	Yeasts and moulds, cfu/g, max.	10^3	ISO 21527-1

8 Packaging

8.1 Fried banana chips shall be packaged in food grade material which will safeguard the hygienic, nutritional and organoleptic qualities of the product.

8.2 The net weight of the packages for fried banana chips may be required to meet the relevant regulations of the destination country.

9 Labelling

9.1 In addition to the requirements of ARS 56, the following specific labelling requirements shall apply and shall be **legibly** and **indelibly** marked:

a) common name of the product 'Fried Banana Chips';

b) name, and physical address of the manufacturer/ distributor and /or trade name/ brand name;

c) if spiced they shall be labelled 'Spiced Fried Banana Chips';

d) date of manufacture;

e) list of ingredients;

f) lot identification;

g) expiry date;

h) country of origin;

i) the net weight in metric units;

j) storage instructions;

k) declaration stating "salted" or "unsalted";

l) declaration of flavouring agent or spice used; and

m) instructions on disposal of used package.

9.2 When labelling non-retail packages, information for non-retail packages shall either be given on the packages or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the packages.

10 Sampling

Sampling of banana chips shall be done in accordance with ISO 13690.

11 Criteria for conformity

A lot shall be declared as conforming to this standard if samples inspected or analysed for quality requirements conform to the provisions of this standard.

Annex A
(normative)

Determination of fat content

A.1 Principle of the method

This is achieved by the Soxhlet method with ether or petroleum ether. When reporting the results, the method and solvents used for extraction shall be stated. All substances which can be extracted from the materials to be tested by the above-mentioned solvents, and which are not volatile when dried for one hour at 105 °C, are reported.

A.2 Soxhlet method

The fatty substance is extracted completely with dry peroxide, free diethyl ether or with dry petroleum ether (boiling point below 60 °C) in a Soxhlet apparatus.

The material to be tested has previously been dried, possibly with addition of Na_2SO_4.

A.3 Reagents

A.3.1 Dry peroxide, free ethyl ether or petroleum ether (B.p. below 60 °C).

A.3.2 Na_2SO_4

A.4 Apparatus

A.4.1 Extraction thimble

A.4.2 Fat-free cotton pad

A.4.3 Soxhlet apparatus

A.4.4 Metal spiral or glass bulb

A.4.5 Oven, 103 °C – 105 °C

A.4.6 Desiccator

A.5 Procedure

About 5 g – 10 g of the finely ground substance is placed in the extraction thimble and latter closed with a fat-free cotton pad. If the material is very rich in fat, it is recommended to mix it intimately with an equal amount of dried sand.

If necessary, the thimble with contents is dried at 100 °C. The extraction is performed in the Soxhlet apparatus.

In order to drain off the solvent from the extraction thimble as completely as possible at the end of each siphonage, a metal spiral of a glass bulb is placed under it.

The extraction shall be continued for at least 4 h, during which time the thimble will have been emptied about 30 times. The apparatus is then taken apart and the petroleum ether distilled off. The last traces of ether and moisture are removed by drying for one hour either in vacuum at 70 °C, or in a drying oven at 103 °C – 105 °C.

By passing an air current through the flask before and after drying, all traces of petroleum ether vapour are removed.

Allow to cool for 20 min in a desiccator and weigh. As a control, the drying shall be repeated for 30 min, followed by blowing through, cooling and weighing.

The difference between two weighings shall not exceed 0.05 % of the fat values obtained, otherwise the drying has to be repeated.

Annex B
(normative)

Determination of free fatty acids

B.1 Apparatus — Soxhlet fat extraction apparatus

B.2 Reagents

B.2.1 Petroleum ether, distilling below 65 °C, or ethyl ether.

B.2.2 Alcohol potassium hydroxide, 0.1 N (use absolute or alcohol denatured with methanol

B.2.3 Alcohol-ether mixture, equal volumes of 96 % alcohol and ethyl ether

B.2.4 Phenolphthalein solution, 1 % in alcohol or alcohol denatured with methanol. Add 0.3 mL per 100 mL mixture of alcohol-ether and add alcoholic KOH solution to a faint pink.

B.3 Procedure

B.3.1 Extract 10.00 g ± 0.01 g of the sample taken in a thimble with petroleum ether for about 4 h in a Soxhlet extraction apparatus. Completely evaporate the solvent from the extraction flask (weighed previously) on a steam bath, cool and weigh the extraction flask with the residue. Dissolve the residue in the extraction flask with the 50 mL of the alcohol-ether phenolphthalein solution. Titrate the dissolved extract, with standard potassium hydroxide solution, to a faint pink colour, which persists for 10 s. If emulsion is formed during titration, dispel by adding a second 50 mL portion of the alcohol-ether phenolphthalein solution.

B.3.2 Make a blank titration on 50 mL of the alcohol-ether phenolphthalein solution and substract this value from the titration value of the sample. If the additional 50 mL portion of the alcohol-ether phenolphthalein solution is added, double the blank titration.

B.4 Calculation

Calculate the acid value from the following formula:

$$\text{Acid value (as oleic acid)} = \frac{56.1VN}{M}$$

where,

V is the volume, in mL, of standard potassium hydroxide solution used;

N is the normality of standard potassium hydroxide solution; and

M is the mass, in g, of the material taken for the test.

Annex C
(normative)

Determination of the sodium chloride content

C.1 Scope

This method determines the content of chlorides.

C.2 Definition

The chloride content corresponds to the sum of all anions (halides) calculated as sodium chloride precipitable with silver ions in a nitric acid solution.

C.3 Principle

Quantitative precipitation of the halides extracted from the ash in a nitric acid solution with $AgNO_3$ in excess.

Back titration of the surplus $AgNO_3$ with ammonium thiocyanate, using ferric alum (ferric ammonium sulphate) as the indicator.

C.4 Reagents

C.4.1 Distilled or demineralized water

C.4.2 $AgNO_3$ solution, 0.1 N (16.9888 g $AgNO_3$)

C.4.3 NH_4SCN solution, 0.1 N (7.6113 g NH_4SCN). In practice a slightly higher weight is taken and the solution is adjusted by dilution against a 0.1 N $AgNO_3$ solution.

C.4.4 Cold saturated $NH_4Fe(SO_4)_2.12H_2O$ solution (approximately 40 %). The ensuing brown colouring is eliminated by adding pure nitric acid dropwise.

C.4.5 HNO_3 (approximately 30 %)

C.4.6 Diethyl ether of nitrobenzene

C.5 Apparatus

C.5.1 Measuring flask, 100 mL

C.5.2 Burette, 50 mL

C.5.3 Erlenmeyer flask, 200 mL

C.5.4 Pipettes

C.5.5 Funnel, filtering paper

C.6 Procedure

The ash (residue after carbonisation and incineration of the potato crisp at a maximum temperature of 550 °C in a muffle furnace) obtained from 1 g – 2 g dry matter is extracted by means of 80 mL – 90 mL hot distilled water acidified with a few drops of nitric acid. The washings are filtered off into a 100 mL measuring flask; after cooling distilled water is added until the mark is reached (stock solution).

In proportion to the expected chloride content aliquot part of this solution, which should preferably contain 50 mg – 100 mg NaCl, taken off, distilled water being added to obtain a quantity of approximately 100 mL.

Subsequently 5 mL ferric alum solution (see C.4.4), 20 mL 0.1 N $AgNO_3$ solution (see C.4.2) and 5 mL – 10 mL ether or 1 mL nitrobenzene are added; titration is carried out by means of an ammonium thiocyanate solution 0.1 N (see C.4.3), until the red colouring remains after stirring.

C.7 Expression of results

Report in percentage by weight to one decimal place.

$$\text{Chloride content} = \frac{5.65\ (V_2 - V_3)\ \text{x}\ V\ \text{x}\ 100}{V_1\ \text{x}\ P}$$

where,

P is the test portion, in mg, incinerated;

V is the mL of the stock solution derived from the ash;

V_1 is the volume, in mL, stock solution used from titration;

V_2 is the volume, in mL, $AgNO_3$ added;

V_3 is the volume, in mL, NH_4SCN necessary for back titration.

Annex D
(normative)

Determination of acid insoluble ash

D.1 Reagent

D.1.1 Dilute Hydrochloric Acid — 1:1, prepared from concentrated hydrochloric acid.

D.2 Procedure

D.2.1 Weigh accurately about 2 g of the dried material in a tared porcelain, silica or platinum dish. Ignite with a meker burner for about 1 hour. Complete the ignition by keeping in a muffle furnace at 500 °C to 570 °C until grey ash results.

Cool and filter through whatman filter paper No. 42 or its equivalent. Wash the residue with hot water until the washings are free from chlorides as tested with silver nitrate solution and return the filter paper and residue to the dish. Keep it in an electric air oven maintained at 135 ± 2 °C for about 3 hrs. Ignite the dish again for about 30 minutes, cool and weigh. Repeat this process till the difference between two successive weighings is less than 1 mg. Note the lowest weight.

D.3 Calculation

D.3.1 Acid insoluble ash, per cent by weight

$$= \frac{100(M_2 - M)}{M_1 - M}$$

where,

M_2 = the lowest weight, in g, of the dish with the acid insoluble ash;

M = weight, in g, of the empty dish; and

M_1 = weight, in g, of the dish with the dried product taken for the test.